ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 1.] JANUARY. [1887.

NOTICE.

It is proposed to issue from time to time, as an occasional publication, notes too detailed for the Annual Report on economic products and plants, to which the attention of the Staff of the Royal Gardens has been drawn in the course of ordinary correspondence, or which have been made the subject of particular study at Kew. It is hoped that while these notes will serve the purpose of an expeditious mode of communication to the numerous correspondence of Kew in distant parts of the Empire, they may also be of service to members of the general public interested in planting or agricultural business in India and the Colonies.

W. T. Thiselton Dyer,
Director.

1st January 1887.

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1887.

Price Twopence.

I.—TEFF.

(*Eragrostis abyssinica.*)

Inquiry having been made at Kew with respect to an Abyssinian cereal of economic value, suitable for cultivation at high elevations, steps have been taken to collect information on the subject, as well as to obtain a supply of seed for distribution.

The following letters and extracts afford a very complete account of Teff; seed will in due course be forwarded to such Botanic Gardens in India and the Colonies as are suitable for its experimental cultivation.

1.

Extract from Richard, *Tentamen Floræ Abyssinicæ*, 1851, Vol. II., p. 429, under *Eragrostis abyssinica*, Link; Nomina abysinica; Ttheff, Tteff, Thaff.

Teff is one of the cereals indigenous to Abyssinia. It is cultivated in a great number of provinces at a height which varies between six and seven thousand feet above the sea level.

Like all other cereals, Teff presents several varieties, some depending on its relative height, others on its general colour.

Thus there is—

1. Green Teff: or Tchangar;
2. White Teff: Ttsada Tthef;
3. Red Teff: Beneigne Tthef;
4. Purple Teff: Kqhaie Tthef.

These different varieties are all cultivated alike. Teff requires four months from the time it is placed in the earth for its grain to become perfectly ripe. In the neighbourhood of Gondar, Teff is sown in August and reaped at the end of November or beginning of December. In good years, it returns about 40 times the seed, and only 20 times in bad years.

The flour of Teff is very white, and produces a bread of excellent quality.

2.

Extract from Bruce's *Travels to discover the Source of the Nile*, Vol. VII., pp. 184–6.

[*Eragrostis abyssinica.*]

This grain is commonly sown all over Abyssinia, where it seems to thrive equally on every sort of ground; from it is made the bread which is commonly used throughout Abyssinia. The Abyssinians, indeed, have plenty of wheat, and some of it of an excellent quality. They likewise make as fine wheat bread as any in the world, both for colour and for taste; but the use of wheat bread is chiefly confined to people of the first rank. On the other hand, Teff is used by all sorts of people, from the king downwards; and there are kinds of it which are esteemed fully as much as the wheat. The best of these is as white as flour, exceedingly light, and easily digested. There are others of a browner colour, and some nearly black; this last is the food of soldiers

and servants. The cause of this variation of colour is manifold; the Teff that grows on light ground having a moderate degree of moisture, but never dry; the lighter the earth is in which it grows, the better and whiter the Teff will be; the husk, too, is thinner. The Teff, too, that ripens before the heavy rains, is usually whiter and finer; and a great deal depends upon sifting the husk from it, after it is reduced to flour, by bruising or breaking it in a stone mill. This is repeated several times with great care, in the finest kind of bread, which is found in the houses of all people of rank or substance.

* * * * *

The fruit, or seed, is oblong, and is not so large as the head of the smallest pin; yet it is very prolific, and produces these seeds in such quantity as to yield a very abundant crop in the quantity of meal.

3.

ROYAL GARDENS, KEW, to FOREIGN OFFICE.

SIR, Royal Gardens, Kew, 23rd June 1886.

I AM directed by Mr. Thiselton Dyer to bring under the notice of Lord Rosebery the desirability of obtaining seed of a valuable cereal commonly sown all over Abyssinia, where it seems to thrive equally on every sort of ground and from which is made the bread ordinarily used in that country.

2. It is called locally Teff, Ttheff, or Thaff, and known to botanists as *Eragrostis abyssinica.*

3. It appears to be an indigenous Abyssinian cereal cultivated at high elevations, from 6,000 feet to 7,000 feet above the level of the sea, of which there are several varieties depending on size and colouration.

4. No specimens of this grain are in the Museums of Economic Botany at Kew, and practically it appears to be unknown outside the confines of Upper Egypt and Abyssinia. An interesting account, under article Teff, is given in Bruce's Travels, Vol. VII., p. 184.

5. These facts have been ascertained in consequence of inquiries made at Kew for seeds of Teff, and it would appear to Mr. Thiselton Dyer that the grain might be very advantageously introduced to certain hill stations in India, to elevated portions of our colonial empire, and, indeed, to all places where maize and wheat cannot be successfully cultivated.

7. Mr. Thiselton Dyer would, under these circumstances, esteem it a favour if you will be good enough to lay this letter before Lord Rosebery, and ask that the Vice-Consul at Berbera be instructed to endeavour to procure a bushel or so of seed of Teff and forward it here by first convenient opportunity.

I have, &c.,

Sir Villiers Lister, K.C.M.G., (Signed) D. MORRIS.
Foreign Office.

4.

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR, Foreign Office, 18th November 1886.

WITH reference to your letter of the 23rd of June, I am directed by the Earl of Iddesleigh to transmit to you herewith a copy of a despatch from Her Majesty's Chargé d'Affaires at Cairo, respecting two bags of Tscheff (*Eragrostis abyssinica*) seed which Mr. Portal has procured through the kindness of General Géné, the officer commanding the Italian garrison at Massowah.

The bags of seed have not arrived at this office, and I am to inquire whether they have been received at Kew Gardens direct from Egypt.

I am, &c.,

The Assistant Director, (Signed) J. PAUNCEFOTE.
Royal Gardens, Kew.

Enclosure in Foreign Office Letter, No. 1.

No. 416.

MY LORD, Cairo, 16th October 1886.

WITH reference to Lord Rosebery's despatch to Sir E. Baring, No. 138, of the 30th June last, forwarding copy of a letter from the Director of Kew Gardens, asking that, if possible, samples should be procured of a cereal called Teff or Tcheff (*Eragrostis abyssinica*), I have the honour to report to your Lordship that through the kindness of the Italian Acting Consul-General, I have been enabled to forward to your Lordship two bags of the seed required which has been procured for him at his request by General Géné, the officer commanding the Italian garrison at Massowah.

General Géné explains that one of the bags contains white Tcheff and the other red Tcheff, that both sorts are cultivated in the same manner, but that the former is more generally preferred by the well-to-do natives on account of its colour.

I have the honour to enclose copy of M. Venanzi's note to me, and of my reply, in which I have taken the liberty of conveying to him and to General Géné the thanks of your Lordship for the kind and courteous readiness which they have shown to comply with the request contained in Lord Rosebery's despatch above quoted.

The bags containing the seed have been forwarded by sea to the address of the Foreign Office.

I have, &c.,

The Earl of Iddesleigh, G.C.B. (Signed) G. H. PORTAL.

Enclosure in Foreign Office Letter No. 2.

M. ET CHER COLLÈGUE, Alexandrie, 14 Oct. 1886.

ME référant à la Note que Sir E. Baring, m'a fait l'honneur de m'adresser en date du 12 Juillet dernier, je m'empresse de vous informer qu' aujourd'hui même j'ai fait expédier par chemin de fer, comme du

connaissement ci-annexé, à l'adresse du Consulat Genl. de S.M.B. au Caire une caisse contenant deux sacs de semence de Tieff (*Eragrotis abyssinica*).

Le Général Gene, que j'avais prié de me procurer à Massowah les semences susdites et qui bien volontiers se chargea de cette commission m'écrit que l'un des sacs contient du Tieff *blanc* et l'autre du Tieff *rouge*, la cultivation des deux semences est la même, mais la première est préférée à cause de sa couleur par les indigènes moins pauvres. Bien heureux d'avoir pu satisfaire au désir exprimé par votre gouvernement.

Je suis, &c.
(Signé) G. Venanzi.

5.

Foreign Office to Royal Gardens, Kew.

Sir, Foreign Office, 2nd December 1886.

With reference to my letter of the 26th ultimo, and to previous correspondence relative to the Tchef seed which has been procured for Kew Gardens through the kindness of the Italian officer commanding at Massowah, I am directed by the Earl of Iddesleigh to forward to you the accompanying paper which has been sent to Sir E. Baring by M. de Martino, the Italian Agent and Consul-General at Cairo, giving various details as to the nature, qualities, mode of cultivation, &c. of the cereal in question.

I am, &c.
(Signed) J. Pauncefote.

The Assistant-Director,
Royal Gardens, Kew.

Enclosure.

Olkraur, 27th September 1886.

Cultivation of Thaf or Thief.

Thaf (in the Tigrina language) or Thief (in the Olmharigna language) belongs to the family of grasses and resembles the finest lawn grass.

There are two kinds: white Thaf and red Thaf. Both are, moreover, of two different qualities, according to the time of sowing, and are in consequence distinguished by the names of the seasons; "Thaf-*Hagaiz*" and "Thaf-*Tseddia*." The first is called "hagaiz," from the name of the season which, according to Abyssinian reckoning, includes all our winter and the commencement of our spring; it is sown at the end of Megabit, in Myazya and Ghembot (March, April, and May). The second is called "Tseddia," from the name of the commencement of the rainy season, which follows that of Hagaiz and precedes that of Keremt; it is sown in June and at the commencement of July.

Thaf-Hagaiz is of slow, and Thaf-Tseddia of rapid growth. These conditions produce great difference in quality, Thaf-Hagaiz being considerably superior; the *white*, especially, is used for the table by the Court and Chiefs. Thaf-Tseddia is of very inferior quality, and the flabby cake, or the "Tabita," which is produced from its flour, is as disagreeable to chew as if it were mixed with sand.

It is therefore the early sowing and vigorous growth of Thaf-Hagaiz, due to being two months longer in the ground, that render it of superior quality.

I ought, however, to add that "Hagaiz" and "Tseddia" cannot be sown indifferently for one another. The experiments which the natives tell me have been made have not met with much success. The seed of Thaf-Hagaiz must be used for the first sowing, and that of Tseddia for the second. The difference between them, both in the case of the white or red, is quite perceptible to the naked eye, by the want of plumpness characteristic of the Thaf-Tseddia relatively to the other.

These seeds almost equal barley in their growth and the rapidity with which they come up. Sown at the end of March or in April and May, they arrive at maturity at the beginning of September. Sown in June or July the crop may be reaped in October.

They are cultivated in the warm regions of the "Konalla," or low-lands, at an altitude of from 1,300 to 1,800 metres, and especially in the temperate regions of the "Ouaynè-Dega," at an altitude of from about 1,800 to 2,400 m.

The Thaf comes up very vigorously in heavy lands, but its large and high tuft is richer in herbage than in grain. The exuberance of its vegetation in these heavy lands causes it to be laid, and then its ear rots. It prefers light soils and adapts itself even to the most sandy; it then produces slender, wiry stems, and supports better the weight of its ear.

The land requires to be prepared and cleaned by three or four ploughings before sowing; but it is true that the ploughings in Abyssinia are light and not very deep. It is sown thickly on the surface of prepared ground. It is afterwards lightly hoed, if necessary, when it has come up.

It is not necessary to wait until it is quite dry, like barley, to cut it, for when too ripe and dried, the grain sheds in the wind and at the least shock. It is cut as soon as the green ear turns to grey, in the early morning, and is placed in heaps with the ears inwards, and covered to preserve it from the rain; it is then left to ripen and to undergo a certain amount of fermentation.

Its flour is only advantageously used in making "Tabita," a kind of large fermented pancake. The "Tabita" of Thaf is most easily digestible, and has none of the bitterness of some other kinds of grain.

(Signed) E. Coulbeaux,
Missionnaire apostolique en Abyssinie.

6.

Analysis of "Teff," red variety, by Professor A. H. Church, M.A., F.C.S.

	In 100 parts.
Water	15·2
Albuminoids	8·2
Starch, &c.	68·1
Oil	2·8
Cellulose, &c.	2·8
Ash	2·9

The ratio between the albuminoids, or flesh-formers, and the heat-givers, or force-producers (calculated as starch), is here 1·9. This ratio is less satisfactory than that of the majority of the millets, but is near that of *Panicum Miliare*.

II.—OIL OF BEN.

Considerable interest attaches to the origin of Oil of Ben, which is supposed to have been exclusively used many years ago by watch and clock makers. It was said to possess special properties, amongst others, that it would not thicken with age, that it remained liquid under very low temperatures, and, lastly, did not become rancid.

Whether such an oil was a natural product or the result of a special treatment of olive and other oils is not clearly known.

For many years an effort has been made by the Hon. H. J. Kemble, of Jamaica, to prepare Oil of Ben from the seeds of *Moringa pterygosperma*, which is well known as the horse-radish tree of tropical countries, and plentifully distributed in both the East and West Indies. The seeds of this tree yield 30 per cent. by weight of a clear, limpid, almost colourless oil. It has a specific gravity of 0·912 at 60° F., it is fluid at 77° F., and solid below 60° F. After separation of the solidifiable portion it forms a clear oil, of which a fine specimen from Madras, more than thirty years old, is now in the Kew Museum.

If this oil were proved to be identical with Oil of Ben there is no doubt its production would be immediately undertaken on a large scale. Dr. Watt states that *Moringa pterygosperma* is so extensively cultivated in India that that country alone could easily enough, and with profit, supply the whole world with Oil of Ben. Similar conditions exist in the West Indies, where the oil can be produced, by cold pressing, at about 8*s.* to 10*s.* per gallon.

In the Report of the Director of the Botanical Department, Jamaica, for the year 1883, it is stated that,—"Great interest is still being taken "in the extraction of Oil of Ben from the seed of the common horse-"radish tree (*Moringa pterygosperma*). Last year I took with me "to England a fine sample of oil prepared by pressure by Mr. Kennedy. "The report which I received from Messrs. Silver and Co. was as "follows:—'It is an oil altogether unknown in this market, the sample "'is far from being bright, and in its present state would be useless "'for either of the trades named in your memorandum.

"'Whatever the oil may be in the West Indies, it appears to be very "'tender here, and although only about three parts congealed now, "'would in the winter months be entirely so.'

"If *Moringa pterygosperma* yields the true Oil of Ben, the prepara-"tion evidently must be different to that hitherto pursued; and it is "possible that the tender condition of the sample submitted to Messrs. "S. W. Silver and Co. was owing to the presence in it of a large "proportion of stearine which should be removed."

The properties and value of the oil of *Moringa pterygosperma* having been so far determined, the next question was to discover whether any other species of Moringa yielded the true Oil of Ben. The genus Moringa consists of only three species, and these are *M. pterygosperma*, Gaertn, *M. aptera*, Gaertn, and *M. concanensis*, Nimm.

The latter is probably only a form of *M. pterygosperma* with larger leaflets; and it can very well be passed over in the present inquiry. There only remains, therefore, *Moringa aptera*.

This latter species has a comparatively narrow distribution, and appears to be confined to Upper Egypt, some parts of Syria, and Aden. At the latter place it was collected by Sir Joseph Hooker in 1847, and he describes it as a "weeping tree, about 17 feet high, yielding a red

" brown gum." Other travellers have collected specimens at Aden, now in the Kew Herbarium, among whom may be mentioned Anderson, 1859, and Bayley Balfour, 1880.

In Irby and Mangles' Travels in Petræa and the Dead Sea, p. 469, there is the following reference to this tree :—" A very singular plant " grows near the hot sources [Callirrhoe springs], of the bulk and " stature of a tree; its foliage does not seem to differ from that of the " common broom. It bears a pod hanging down from it about a foot " or fourteen inches in length fluted with convex ribs from the end to " the point; we never met this before."

Specimens in the Kew Museum marked " Seed of a tree near the hot " springs of Callirrhoe," evidently refer to the above, and are undoubtedly *Moringa aptera.*

The Kew Herbarium possesses specimens collected by Lord in the Sinai Peninsula in 1868, by Lowne at Engedi in 1864, by Ehrenberg in Arabia in 1870, by Rohr in Abyssinia in 1841, and by Schweinfurth, Thebais in 1885.

The following note appears on a specimen from Gay's Herbarium :— " Delile m'a dit, le 17 Octobre 1835, qu'il falloit rapporter au *Moringa* " *aptera*, le *Moringa nux Ben* de sa Fl. Ægypt. Illustr., p. 81. Les " graines qui se vendent dans les boutiques du Caire et d'Alexandrie, " sous le nom de habbat et ghâlz, et dont on extrait l'huile de Ben, " appartient au *Moringa aptera*, Gaertn."

According to Decaisne [Ann. des Sc. Nat. 2e ser., Vol. IV., pp. 204, 205], *Moringa aptera* has been introduced at Cairo, where it is now cultivated from seeds brought from Sennaar. Thence they are exported into Syria.

" Il parait certain que ce sont elles qui produisent, par l'expression de leurs cotyledons, l'huile de Ben du commerce, c'est du moins l'opinion des anciens auteurs. Van Rheede et Rumphius, qui s'entendent longuement sur une foule d'usages auquels on emploie les feuilles ou les graines du *Moringa pterygosperma* ne disent cependant pas qu'on en fasse de l'huile, tandis que Belon fait plusieurs fois mention de ce produit et de l'arbre lui-même, sous le nom de *Balanus myrepsica.* Il le cite dans son voyage au Mont Sinai, où il ne parait plus exister aujourd'hui."

In the hope of obtaining seeds, application was made to Dr. Georg Schweinfurth, the celebrated African traveller; the following reply was received :—

Dr. Schweinfurth to Director, Royal Gardens, Kew.

Dear Sir, Cairo, 11th October 1880.

I found your kind letter of the 19th September on my return from the Lebanon, where I spent the last summer, and I hastened to get the information you wanted about the Ben-oil.

I visited many of the old Arabian oil presses here, but nobody knew anything of Moringa or of its products, although I showed specimens of the fruits. It appears to me probable that Moringa oil is not now manufactured in Cairo, but that it is imported from elsewhere, if at all in use.*

Moringa aptera, Gaertn (Moringa arabica, *Lam.*, Hyperanthera peregrina, *Forsk*, H. semidecandra, *Vahl.*), grows wild in the East-Arabian desert of Upper Egypt, and I found it often in the mountains

* No mention is made of Moringa oil in Figari's " Studj scientifici sul Egitto," in which work all drugs of Cairo are enumerated.

south of Kossér, near the Red Sea; on the Gebel Abu Tiŭr, in Wady Hendōsse, the northern limit was in Wadi Hauaschieh, northward of Gebel Gharib. The tree occurs also frequently on the borders of the Nubian desert; I found it there on the Gebel Soturba (22° North lat.), on the Gebel Waratáb, near Suakin, on the Gebel Iskenáb, at the road Suakin-Kassala. I have specimens of it in my herbarium from the land of the Habab (between Suakin and Massawa), also from Aden and Gumfuda (also in Dongola).

In the gardens of Cairo is *Moringa aptera* nowhere to be found, whilst *M. pterygosperma* is largely distributed. I have about 5 lbs. of seeds of the latter, which are at your disposition, if you need any. These seeds develop well here, and contain much oil.

I am sorry not to be able to send you the desired seeds of *M. aptera*.

I am, &c.

(Signed) G. Schweinfurth.

P.S.—The Arabian name among the Bedouins in Egypt is "El Yes-"sár" for *M. aptera*, while "El Ben" is the Arabian (or Persian) name for *M. pterygosperma*.

In 1885 seed of *Moringa aptera* was received from Messrs. Haage and Schmidt, of Erfurt, and a small quantity was distributed to Jamaica, Demerara, Dominica, Calcutta, and Ceylon. In May of the present year a few seeds were obtained from Mr. Ernest A. Floyer, Inspector General of Egyptian Telegraphs, who mentions that the Arabic name of the tree is "Yessar," and describes the tree as growing to a height of 20 feet. He further mentions that in the valley of Kittar, a mountain gorge with a single pool of water, surrounded by 96 miles of treeless and waterless desert, "The tree has leaves in long spines like a tamarisk, "and has copious sprays of waxy flowers, with a beautiful smell like "fresh hay, and an additional merit, very good camel fodder."

A few seeds additional to the above were received from Dr. Schweinfurth in June of this year, which, with seeds previously received, were sown at Kew, and yielded several strong plants.

It is a noticeable point with regard to young plants of *Moringa aptera* that they form a tuberous root, during the first year's growth, of considerable size. This tuber, it appears, is eaten by the Bedouins, and in taste is very similar to the common radish.

As regards the oil yielded by the seeds of *Moringa aptera*, nothing as yet can be done. When the plants now growing in the East and West Indies have produced seed they will be tested with this view, and the subject again brought under notice.

D. M.

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